

# ***Class Copy Do Not Write On or Remove***

## ***Worksheet for Basic Stoichiometry***

### **Part 1: Mole $\longleftrightarrow$ Mass Conversions**

Convert the following number of moles of chemical into its corresponding mass in grams.

1. 0.436 moles of ammonium chloride
2. 2.360 moles of lead (II) oxide
3. 0.031 moles of aluminum iodide
4. 1.077 moles of magnesium phosphate
5. 0.50 moles of calcium nitrate

Convert the following masses into their corresponding number of moles.

6. 23.5 g of sodium chloride
7. 0.778 g of sodium cyanide
8. 0.250 g of water
9. 169.45 g of calcium acetate
10. 79.9 g of potassium permanganate

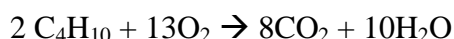
### **Part 2: Moles $\longleftrightarrow$ Number of Particles Conversions**

Convert the following number of moles into their corresponding number of particles.

11. 0.0455 moles of hydrochloric acid
12. 1.2 moles of glucose (C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>)
13. 0.32 moles of sodium bicarbonate

### **Part 3: Solve the following stoichiometry grams-grams problems:**

- 1) The combustion of a sample of butane, C<sub>4</sub>H<sub>10</sub> (lighter fluid), produced 2.46 grams of water.



- (a) How many moles of water formed?
- (b) How many moles of butane burned?
- (c) How many grams of butane burned?
- (d) How much oxygen was used up in moles?
- (e) How much oxygen was used up in grams?

- 2) Using the following equation:  $2 \text{NaOH} + \text{H}_2\text{SO}_4 \rightarrow 2 \text{H}_2\text{O} + \text{Na}_2\text{SO}_4$

How many grams of sodium sulfate will be formed if you start with 200 grams of sodium hydroxide and you have an excess of sulfuric acid? (**ANSWER 355.3g Na<sub>2</sub>SO<sub>4</sub>**)

- 3) Using the following equation:  $\text{Pb}(\text{SO}_4)_2 + 4 \text{LiNO}_3 \rightarrow \text{Pb}(\text{NO}_3)_4 + 2 \text{Li}_2\text{SO}_4$

How many grams of lithium nitrate will be needed to make 250 grams of lithium sulfate, assuming that you have an adequate amount of lead (IV) sulfate to do the reaction?

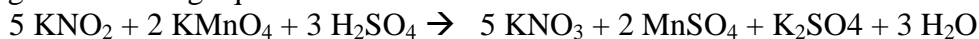
- 4) Using the following equation:  $\text{Fe}_2\text{O}_3 + 3 \text{H}_2 \rightarrow 2 \text{Fe} + 3 \text{H}_2\text{O}$

Calculate how many grams of iron can be made from 16.5 grams of Fe<sub>2</sub>O<sub>3</sub> by the following equation.

- 5) Using the following equation:  $2 \text{I}_2 + \text{KIO}_3 + 6\text{HCl} \rightarrow 5\text{ICl} + \text{KCl} + 3\text{H}_2\text{O}$

Calculate how many grams of iodine are needed to prepare 28.6 grams of ICl by this reaction.

- 6) Using the following equation:



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How many moles and how many grams of  $\text{KMnO}_4$  are needed to carry out this reaction on 11.4 grams of  $\text{KNO}_2$ ?

7) Using the following equation:  $4 \text{NH}_3 + 5 \text{O}_2 \rightarrow 4 \text{NO} + 6 \text{H}_2\text{O}$

How many moles and how many grams of oxygen ( $\text{O}_2$ ) are needed to react with 56.8 grams of ammonia by this reaction?

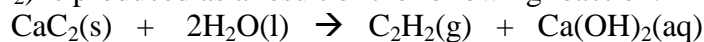
8) Using the following equation:  $\text{NaIO}_3 + 6 \text{HI} \rightarrow 3 \text{I}_2 + \text{NaI} + 3 \text{H}_2\text{O}$

Calculate the number of moles and the number of grams of iodine ( $\text{I}_2$ ) that can be made this way from 16.4 grams of  $\text{NaIO}_3$ .

9)  $\text{Mg(s)} + 2\text{HCl(aq)} \rightarrow \text{MgCl}_2\text{(aq)} + \text{H}_2\text{(g)}$

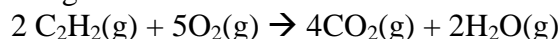
- How many grams of  $\text{HCl}$  are consumed by the reaction of 2.50 moles of magnesium?
- What is the mass in grams of  $\text{H}_2$  gas when 4.0 moles of  $\text{HCl}$  is added to the reaction?

10) Acetylene gas ( $\text{C}_2\text{H}_2$ ) is produced as a result of the following reaction.



- If 3.20 moles of  $\text{CaC}_2$  are consumed in this reaction, how many grams of  $\text{H}_2\text{O}$  are needed?
- How many grams of  $\text{Ca(OH)}_2$  would be formed with 3.20 moles of  $\text{CaC}_2$ ?

11) Acetylene gas,  $\text{C}_2\text{H}_2$ , is used in welding, produces an extremely hot flame when it burns in pure oxygen according to the following reaction.

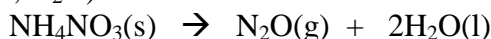


How many moles of water ( $\text{H}_2\text{O}$ ) are produced when 25.0 grams of  $\text{C}_2\text{H}_2$  burns completely?

12)  $3 \text{Mg} + 1 \text{Fe}_2\text{O}_3 \rightarrow 2 \text{Fe} + 3 \text{MgO}$

How many moles of iron,  $\text{Fe}$ , are produced with 25.0 grams of magnesium,  $\text{Mg}$ ?

13) Laughing gas (nitrous oxide,  $\text{N}_2\text{O}$ ) is sometimes used as an anesthetic in dentistry.



- How many moles of  $\text{NH}_4\text{NO}_3$  are required to produce 33.0g of  $\text{N}_2\text{O}$ ?
- How many moles of water are produced with 45.0g of  $\text{N}_2\text{O}$ ?

### Part I3

- |                                      |                            |  |                                   |                           |                        |
|--------------------------------------|----------------------------|--|-----------------------------------|---------------------------|------------------------|
| 1. a. 0.137mol $\text{H}_2\text{O}$  | b. 0.0273                  | mol $\text{C}_4\text{H}_{10}$              | c.1.59g $\text{C}_4\text{H}_{10}$ | d.0.178mol $\text{O}_2$   | e. 5.69 g $\text{O}_2$ |
| 3. 386.3g of $\text{LiNO}_3$         | 9. a 182g $\text{HCl}$     | b.4.0g $\text{H}_2$                        | 10. a. 115g $\text{H}_2\text{O}$  | b. 237g $\text{Ca(OH)}_2$ |                        |
| 11. 0.960 moles $\text{H}_2\text{O}$ | 12. 0.686 mole $\text{Fe}$ | 13. a. 0.749 mole $\text{NH}_4\text{NO}_3$ | b. 2.04 mole $\text{H}_2\text{O}$ |                           |                        |

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